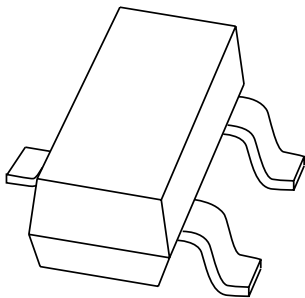


DATA SHEET



BCW31; BCW32; BCW33 NPN general purpose transistors

Product specification
Supersedes data of 1999 Apr 13

2000 Jul 04

NPN general purpose transistors

BCW31; BCW32; BCW33

FEATURES

- Low current (100 mA)
- Low voltage (32 V).

APPLICATIONS

- General purpose switching and amplification.

DESCRIPTION

NPN transistors in a plastic SOT23 package.
PNP complements: BCW29 and BCW30.

MARKING

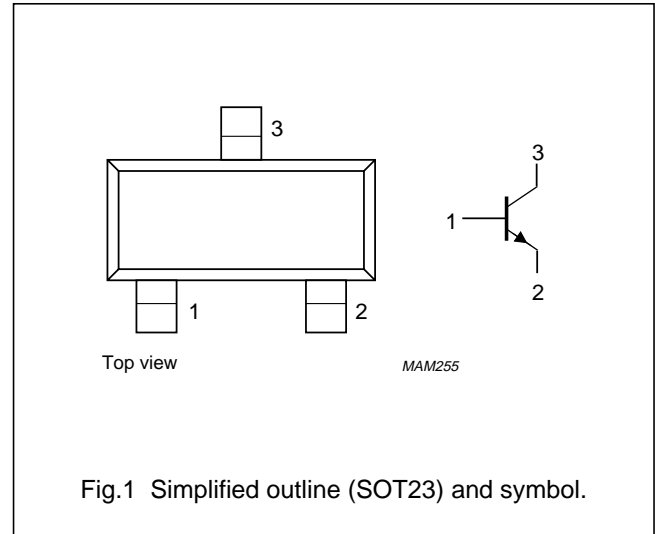
| TYPE NUMBER | MARKING CODE ⁽¹⁾ |
|-------------|-----------------------------|
| BCW31 | D1* |
| BCW32 | D2* |
| BCW33 | D3* |

Note

- * = p : Made in Hong Kong.
* = t : Made in Malaysia.

PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1 | base |
| 2 | emitter |
| 3 | collector |



LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|-------------------------------|--------------------------------|------|------|------|
| V_{CBO} | collector-base voltage | open emitter | – | 32 | V |
| V_{CEO} | collector-emitter voltage | open base; $I_C = 2\text{ mA}$ | – | 32 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 5 | V |
| I_C | collector current (DC) | | – | 100 | mA |
| I_{CM} | peak collector current | | – | 200 | mA |
| I_{BM} | peak base current | | – | 200 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | – | 250 | mW |
| T_{stg} | storage temperature | | –65 | +150 | °C |
| T_j | junction temperature | | – | 150 | °C |
| T_{amb} | operating ambient temperature | | –65 | +150 | °C |

NPN general purpose transistors

BCW31; BCW32; BCW33

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1 | 500 | K/W |

Note

1. Transistor mounted on an FR4 printed-circuit board.

CHARACTERISTICS

$T_j = 25\text{ °C}$ unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------|--------------------------------------|---|------|------|------|---------------|
| I_{CBO} | collector cut-off current | $I_E = 0; V_{CB} = 32\text{ V}$ | – | – | 100 | nA |
| | | $I_E = 0; V_{CB} = 32\text{ V}; T_j = 100\text{ °C}$ | – | – | 10 | μA |
| I_{EBO} | emitter cut-off current | $I_C = 0; V_{EB} = 5\text{ V}$ | – | – | 100 | nA |
| h_{FE} | DC current gain | $I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$ | – | 190 | – | |
| | | | – | 330 | – | |
| | | | – | 600 | – | |
| | DC current gain | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$ | 110 | – | 220 | |
| | | | 200 | – | 450 | |
| | | | 420 | – | 800 | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$ | – | 120 | 250 | mV |
| | | $I_C = 50\text{ mA}; I_B = 2.5\text{ mA}$ | – | 210 | – | mV |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$ | – | 750 | – | mV |
| | | $I_C = 50\text{ mA}; I_B = 2.5\text{ mA}$ | – | 850 | – | mV |
| V_{BE} | base-emitter voltage | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$ | 550 | – | 700 | mV |
| C_C | collector capacitance | $I_E = I_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$ | – | 2.5 | – | pF |
| f_T | transition frequency | $I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$ | 100 | – | – | MHz |
| F | noise figure | $I_C = 200\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 2\text{ k}\Omega;$ $f = 1\text{ kHz}; B = 200\text{ Hz}$ | – | – | 10 | dB |

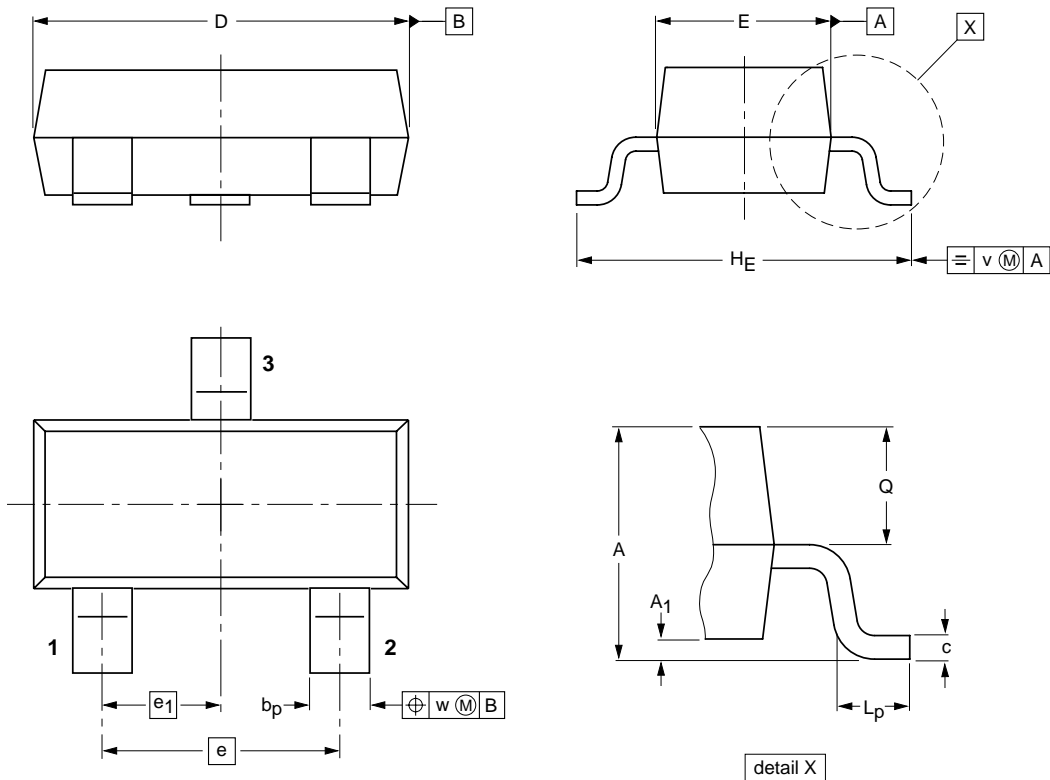
NPN general purpose transistors

BCW31; BCW32; BCW33

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ max. | b _p | c | D | E | e | e ₁ | H _E | L _p | Q | v | w |
|------|------------|------------------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm | 1.1 0.9 | 0.1 | 0.48 0.38 | 0.15 0.09 | 3.0 2.8 | 1.4 1.2 | 1.9 | 0.95 | 2.5 2.1 | 0.45 0.15 | 0.55 0.45 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|----------|------|--|---------------------|-----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT23 | | TO-236AB | | | | 97-02-28- 99-09-13 |

NPN general purpose transistors

BCW31; BCW32; BCW33

DATA SHEET STATUS

| DATA SHEET STATUS | PRODUCT STATUS | DEFINITIONS ⁽¹⁾ |
|---------------------------|----------------|--|
| Objective specification | Development | This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice. |
| Preliminary specification | Qualification | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
| Product specification | Production | This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |

Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

DEFINITIONS

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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NPN general purpose transistors

BCW31; BCW32; BCW33

NOTES

NPN general purpose transistors

BCW31; BCW32; BCW33

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